Listing of Claims

This listing of claims will replace all prior versions and listings of claims in the Application.

1. (CURRENTLY AMENDED) A method of improving the interface between a dielectric and a semiconductor material comprising the steps of:

~~preparing a passivated~~ passivating a semiconductor surface by forming one atomic layer of a valence-mending agent on the semiconductor surface to eliminate dangling bonds on the semiconductor surface, the valence-mended semiconductor surface substantially retaining its semiconductor properties; ~~using a valance mending agent;~~

depositing a precursor to a dielectric on the valence-mended semiconductor surface; and

oxidizing the precursor to a dielectric~~, wherein depositing and oxidizing do not damage the valence-mended semiconductor surface~~.

2. (ORIGINAL) The method of claim 1, wherein the precursor to a dielectric is a metal selected from the group of metals whose oxide is a dielectric.

3. (CURRENTLY AMENDED) The method of claim 1, wherein the step of oxidizing is conducted in an oxygen-containing ambient.

4. (CURRENTLY AMENDED) The method of claim ~~3~~1, wherein the oxygen-containing ambient is selected from the group consisting of pure oxygen, an oxygen and hydrogen mixture, water vapor, an oxygen and nitrogen mixture, nitric oxide, nitrous oxide, ozone and combinations thereof.

5. (ORIGINAL) The method of claim 1, wherein the semiconductor surface is selected from the group consisting of silicon, germanium, silicon-germanium and silicon-carbide.

6. (CURRENTLY AMENDED) The method of claim 1, wherein the step of depositing a precursor to a dielectric is by evaporation selected from the group consisting of thermal evaporation and electron-beam evaporation.

7. (CURRENTLY AMENDED) The method of claim 1, wherein the step of oxidizing is from a few seconds to a few hours.

8. (CURRENTLY AMENDED) The method of claim 1, wherein the step of oxidizing uses a pressure from a few milli-Torr to atmospheric pressure.

9. (CURRENTLY AMENDED) The method of claim 1, wherein the valence-mending agent ~~passivating agent~~ is selected from the group consisting of Group V, VI, or VII congener, or hydrogen.

10. (CANCELED) The method of claim 1, wherein the valence-mended semiconductor surface is one atomic layer thick.

11. (ORIGINAL) The method of claim 1, wherein during oxidizing the valence-mended semiconductor surface is at a temperature selected from room temperature to 800 degrees Centigrade, and any temperature in between.

12. (CURRENTLY AMENDED) The method of claim 1, wherein during the step of depositing the precursor to a dielectric the valence-mended semiconductor surface is at a temperature selected from room temperature to 500 degrees Centigrade, and any temperature in between.

13. (ORIGINAL) The method of claim 1, wherein the method significantly improves the capacitance-voltage characteristics of the interface between the dielectric and the valence-mended semiconductor surface.

14. (CURRENTLY AMENDED) A method of improving the interface between a high-k dielectric and a silicon (100) surface comprising the steps of:

passivating the silicon (100) surface by valence-mending by forming one atomic layer of an agent from the group of sulphur, selenium, tellurium ~~using a Group VI element~~ and hydrogen on the silicon (100) surface to eliminate dangling bonds on the silicon (100) surface, the valence-mended silicon (100) surface substantially retaining its semiconductor properties;

depositing a film of metal on the valence-mended silicon (100) surface; and

oxidizing the metal film to convert the metal film to a metal oxide film with a dielectric constant larger than 4.

15. (CURRENTLY AMENDED) The method of claim 14, wherein the step of oxidizing is conducted in an oxygen-containing ambient selected from the group consisting of pure oxygen, an oxygen and hydrogen mixture, water vapor, an oxygen and nitrogen mixture, nitric oxide, nitrous oxide, ozone and combinations thereof.

16. (CANCELED) The method of claim 14, wherein depositing and oxidizing do not damage the passivated silicon (100) surface.

17. (CURRENTLY AMENDED) The method of claim 14, wherein the step of depositing is by evaporation selected from the group consisting of thermal evaporation and electron-beam evaporation.

18. (CURRENTLY AMENDED) The method of claim 14, wherein the step of oxidizing is from a few seconds to a few hours.

19. (CURRENTLY AMENDED) The method of claim 14, wherein the step of oxidizing uses a pressure from a few milli-Torr to atmospheric pressure.

20. (CANCELED) The method of claim 14, wherein passivating results in a valence-mended silicon surface of one atomic layer thick.

21. (CURRENTLY AMENDED) A method of improving the interface between a dielectric and a silicon-germanium (100) surface comprising the steps of:

passivating the silicon-germanium (100) surface by valence-mending by forming one atomic layer of an agent from the group of sulphur, selenium, tellurium ~~using a Group VI element~~ and hydrogen on the silicon-germanium (100) surface to eliminate dangling bonds on the silicon-germanium (100) surface, the valence-mended silicon-germanium (100) surface substantially retaining its semiconductor properties ;

depositing a film of metal on the valence-mended silicon-germanium (100) surface; and

oxidizing the metal film to convert the metal film to a metal oxide film which is a dielectric.

22. (CURRENTLY AMENDED) The method of claim 21, wherein the step of oxidizing is in an oxygen-containing ambient selected from the group consisting of pure oxygen, an oxygen and hydrogen mixture, water vapor, an oxygen and nitrogen mixture, nitric oxide, nitrous oxide, ozone and combinations thereof.

23. (CANCELED) The method of claim 21, wherein depositing and oxidizing do not damage the passivated silicon-germanium (100) surface.

24. (CURRENTLY AMENDED) The method of claim 21, wherein the step of depositing is by evaporation selected from the group consisting of thermal evaporation and electron-beam evaporation.

25. (CURRENTLY AMENDED) The method of claim 21, wherein the step of oxidizing is conducted from a few seconds to a few hours.

26. (CURRENTLY AMENDED) The method of claim 21, wherein the step of oxidizing uses a pressure from a few milli-Torr to atmospheric pressure.

27. (CANCELED) The method of claim 21, wherein passivating results in a valence-mended silicon-germanium surface of one atomic layer thick.